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(19)

(54) IMPROVEMENTS IN OR RELATING TO CURRENT COLLECTORS FOR USE WITH OVERHEAD POWER CABLES

(71) We, MORGANITE CARBON LIMITED, of Battersea Church Road, London, S.W.11, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention comprises improvements in or relating to current collector arrangements such as are used on railway vehicles supplied from overhead power conductors. Such a collector arrangement makes electrical contact with the overhead conductor through a carbon block or blocks mounted in a holder carried on a linkage, commonly referred to as a "pantograph", which is constructed to press the block or blocks against the conductor and yet to accommodate variations in height of the conductor above the track on which the vehicle is travelling. The pantograph usually has associated with it a pressure-fluid actuated operating mechanism for raising the arrangement into the operating position and for lowering it when not required. The mechanism is usually pneumatic.

It will be appreciated that the high maximum speeds expected with modern railway vehicles will give rise to a number of difficulties. One such difficulty is the possibility of damage being caused to the overhead conductors in the event that a carbon block breaks or becomes excessively worn. This invention is concerned with reducing the possibility of such damage.

According to the present invention there is provided, for a current collector arrangement, a carbon block for contacting a railway overhead power conductor, the block having in it a tubular fluid container so that, on occurrence of breakage or excessive wear of the carbon block, the container is ruptured allowing a flow of the fluid or another change of a fluid condition to occur within the container which is to be utilised to effect retraction of the current collector arrangement from contact with the conductor.

Preferably the fluid is pressure air, as commonly used for operating a motor for raising and lowering pantographs, the sudden decrease of the pressure in the tubular container when it ruptures being utilised to initiate lowering of the current collector arrangement. The tubular container may in this case be a thin-walled tube of a suitable elastomer or plastics material.

The invention is particularly suited for application to current collector arrangements in which a holder has in it a single-length carbon block, either curved or straight.

The carbon block may for instance have a channel extending lengthwise through it or along its surface remote from its conductor-contacting surface, the tube being in the channel. The tube in such a construction may be of say a silicone rubber, but it may be of other materials, e.g. plastics such as P.T.F.E., capable of withstanding the high temperatures, e.g. 200°C, likely to be experienced. The tube will also most conveniently be bonded, as by an adhesive, e.g. a low-temperature silicone rubber such as that marketed under the trade name "Silastor Seal" with which has been mixed a silane primer such as that marketed as MS Primer, to the carbon block to increase the certainty of rupture on breakage.

Alternatively, the tube may be formed integrally with the carbon block for instance by coating a through-bore in the carbon with a material rendering the surface of the bore fluid-tight. Such material may be an Evostick (Registered Trade Mark) adhesive, which is thought to be a polychloroprene synthetic rubber and blend of synthetic resins, suitably thinned down, using say a mixture of aliphatic and aromatic hydrocarbons and esters, to make it flow through the bore.

In the accompanying drawing:—

Figures 1 to 3A show three possible arrange-

ments of carbon block 10 each with a rupturable tube 11 fitted in it as a safety device and with a holder 12, and

Figure 4 illustrates a form of control to be actuated by rupture of the tube.

In Figures 1 and 1A, and in Figures 2 and 2A, the tube is in a channel extending along the centre line of the surface of the contact block remote from its conductor-contacting surface, and in Figures 3 and 3A the channel is offset from the centre line.

The form of control illustrated diagrammatically in Figure 4 is such that rupture of the tube 11 causes retraction of the block 10 from contact with the overhead conductor through the pneumatic motor 14 usually provided for raising and lowering the pantograph.

The compressed air supply is fed to the mechanism under control of a two-position valve 15 in the first position of which the pressure air is fed to pipe line 16 and in the second of which the line 16 is connected to exhaust line 17.

When valve 15 is moved to the first position under normal conditions, pressure air flows past a throttle 18 to pipe line 19 leading to an end chamber 20 of a valve casing 21 containing a piston valve 22. The chamber 20 is connected to the tube 11 so that the pressure in these rises and the piston valve 22 is thus moved to the right from the position shown to a position in which a branch line 23 from pipe line 16 is connected to a supply line 24. Supply line 24 leads to the motor 14 which is thus supplied with pressure air to raise the pantograph.

In the event of rupture of the tube 11, pressure air will flow from the tube 11 and chamber 20 and, due to the presence of the throttle 19, the pressure in these parts will drop sharply allowing spring 25 to move the piston valve 22 to the position shown in which supply line 24 is cut off from branch line 23 and instead is connected to exhaust line 26. Thus air exhausts from the motor 14 allowing the pantograph to lower.

When in normal circumstances the valve 15 is moved to the second position, the tube 11 and the chamber 20 are connected to exhaust line 17 so that chamber 20 becomes de-pressurised and valve 22 is moved to the position shown, whereby the pantograph is lowered.

The invention is also applicable to collectors using short-length carbon blocks. For instance, a number of short-length blocks may be arranged end to end in a holder formed with a corresponding number of chordwise flats set at a small angle to one another so that, with the blocks in position, the equivalent of a curved single-length block is obtained. In this case the rupturable tube will conveniently extend through aligned channels in the blocks.

WHAT WE CLAIM IS:—

1. A carbon current collector block for contacting a railway overhead power conductor, the block having in it a tubular fluid container so that, on occurrence of breakage or excessive wear of the carbon block in use, the container is ruptured allowing a change of a fluid condition to occur within the container which is utilised to effect retraction of the block from the conductor.

2. A carbon block according to claim 1, wherein the tubular container is a tube accommodated in a channel extending lengthwise through the carbon block or in its surface remote from the conductor-contacting surface.

3. A carbon block according to claim 1 or claim 2, wherein the container is a thin-walled tube of a suitable elastomer or plastics material.

4. A carbon block according to claim 2 or claim 3, wherein the tube is bonded to the carbon block.

5. A carbon block according to claim 1, wherein the tubular container is formed as an integral part of the block.

6. A carbon block according to claim 5, wherein the tubular container is formed by rendering fluid-tight a lengthwise bore through the block.

7. A carbon block substantially as hereinbefore described with reference to and as illustrated in Figures 1 and 1A, or Figures 2 and 2A, or Figures 3 and 3A of the drawings.

8. A current collector arrangement comprising a carbon block as claimed in any of claims 1 to 7, carried in a holder on a retractable linkage, a motor operated by pressure air to raise and lower the linkage, a pressure air supply to the tubular container in the block, and a mechanism actuated by a drop in air pressure on rupture of the container to cause the motor to lower the linkage.

9. A current collector arrangement according to claim 8, comprising a number of carbon blocks as specified in any of claims 1 to 7 and of short length, which blocks are positioned end to end in a holder and the tubular container extends through aligned channels in the blocks.

10. A current collector arrangement according to claim 9, wherein the holder is formed with chordwise flats corresponding in number to the number of short-length blocks so that these together form the equivalent of a curved single-length block.

11. A current collector arrangement according to any of claims 8 to 10, wherein the mechanism controlling raising and lowering of the linkage is substantially as hereinbefore described with reference to Figure 4 of the accompanying drawings.

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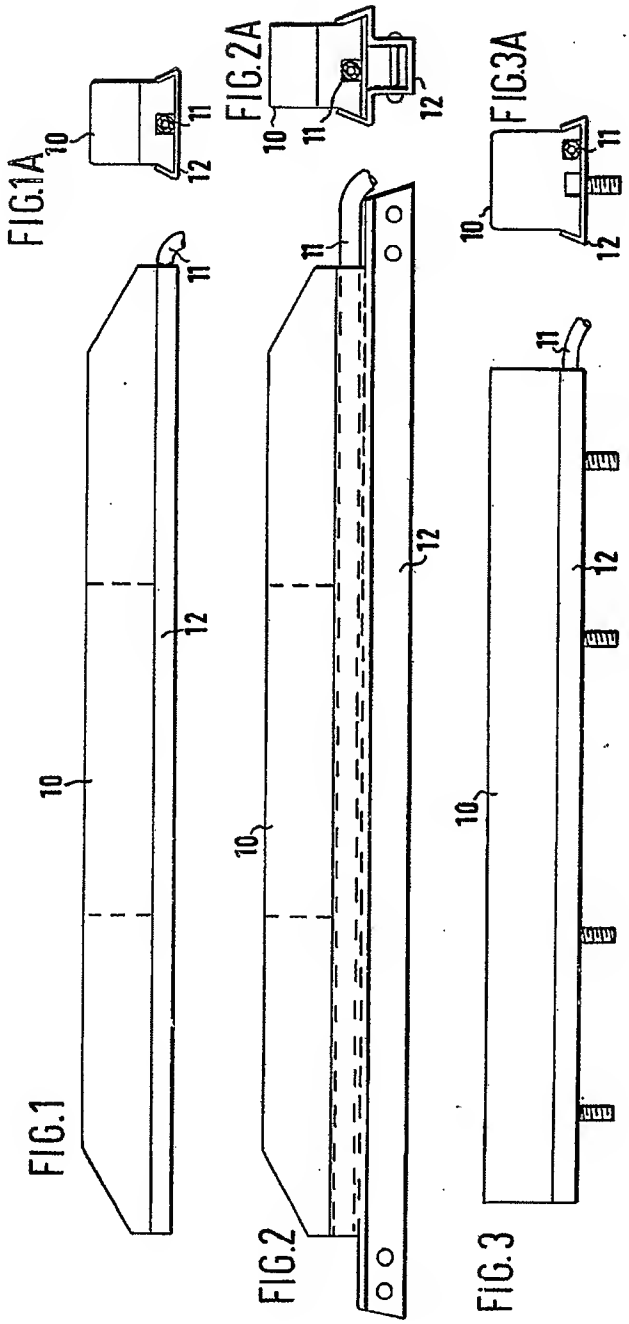
1374972 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1



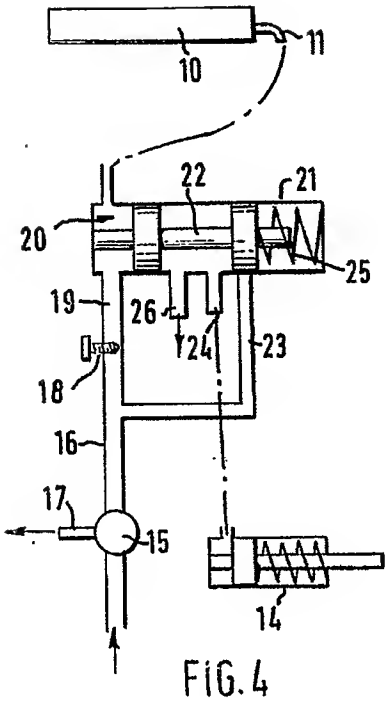


FIG. 4